

Notice of Allowability

Application No.

09/732,177

Examiner

Ayal I. Sharon

Applicant(s)

HASEGAWA, KENICHI

Art Unit

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to After-Final Amendment filed 3/20/06.
2. ☒ The allowed claim(s) is/are 1-12.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☒ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: Japanese Patent Application 11-347375.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

Introduction

1. Claims 1-12 of U.S. Application 09/732,177, originally filed on 12/07/2000 are currently pending. The application claims priority to Japanese Patent Application 11-347375, filed on 12/07/1999.
2. The After-Final Amendment dated 03/20/2006 amended independent claim 7.

Examiner's Statement of Reasons for Allowance

3. Claims 1-12 are allowed. The following is an examiner's statement of reasons for allowance for claims 1-12
4. The prior art referred to in this Reasons for Allowance is as follows:
 - a. Morich, M. U.S. Patent 5,296,810. Date of Patent: March 22, 1994.
("Morich").
 - b. Jin, Jian-Ming. "Electromagnetics in Magnetic Resonance Imaging." IEEE Antennas and Propagation Magazine. Dec. 1996. Vol.40, Issue 6, pp.7-22.
("Jin").
5. In regards to claim 1, Morich teaches the following: 1. A method of designing a magnetic field gradient coil assembly using tightly wound inner and outer coils, said method comprising the steps of:

(See Morich, especially: col.1, line 65 to col.2, line 10)

setting or resetting the number of said inner coils and optimizing their positions such that a resulting magnetic field strength falls within a tolerable range of a target magnetic field gradient under shielded conditions;

(See Morich, especially: Fig.7, Item 100 and associated text at col.7, lines 17-29)

setting or resetting the number of said outer coils and the number of turns of each outer coil;

(See Morich, especially: Fig.7, Item 110 and associated text at col.7, lines 29-41)

calculating Fourier components of an electric current spatial distribution necessary for the outer coils;

(See Morich, especially: Fig.7, Item 120; and col.7, line 41 to col.8, line 2; and col.8, line 51 to col.9, line 32)

optimizing positions of the outer coils to approximate the Fourier components of the current distribution;

(See Morich, especially: Fig.7, Item 124 and associated text at col.8, lines 3-12)

calculating magnetic fields leaking from the inner and outer coils, respectively;

(See Morich, especially: Fig.7, Item 130 and associated text at col.8, lines 34-50)

6. However, Morich does not expressly teach the following limitations:

calculating magnetic field distortions caused by eddy currents at the outside of said outer coil produced by the leaking magnetic fields; and

resetting the number of the outer coils and the number of turns of each outer coil such that the magnetic field distortions caused by eddy currents fall within a tolerable range.

7. In the previous Office Action, Examiner argued that Jin teaches the limitations

not taught by Morich. More specifically, Examiner argued that Jin expressly

identifies the claimed problem (See Jin, p.12, "4.4 Shielded Gradient Coils", 1st

para. Emphasis added):

One of the major problems in the use of switched gradient coils is the interaction of the rapidly switched fields with other conducting structures in an MRI system. The magnetic field produced by a gradient coil induces eddy currents in other conducting structures, which produce fields opposing that of the gradient coil. As a result, the gradient homogeneity can be degraded, and the rise and decay times of the switched field can be increased.

Jin also teaches the solution to the problem (See Jin, p.12, "4.4 Shielded Gradient Coils", 3rd para. Emphasis added):

Basically, the shield coil produces a field that cancels that of the primary coil, outside the shield coil. As a result, the total field is zero outside the gradient coil. This technique is referred to as active shielding.

Jin also expressly teaches (See Jin, p.13, left column, 2nd para.):

Figure 11 shows the current distribution on the primary and shield coils of a shielded longitudinal transverse-gradient coil. Shielded longitudinal-gradient coils can be designed in a similar manner.

Examiner interpreted that Jin's "Axial Distance" parameter was used to calculate the distance between the turns of each outer coil, from which the number of turns can be derived.

8. In the After Final Amendment filed on 3/20/2006, the Applicant persuasively argues (see p.7) that Jin differs from the claimed invention because "Jin shows calculations [(18)-(20)] and obtains the current distributions on the primary and shield coils, as shown in Figs. 11a and 11b. However, these calculations are used to find the current distribution on the shield coil and never suggest calculation of magnetic fields leaking from the inner and outer coils."
9. Examiner therefore agrees with Applicant's argument (see p.7 of the After-Final Amendment filed 3/20/2006) that "the combination of Morich and Jin fails to teach calculating distortions caused by leaking fields."
10. Examiner therefore finds that independent claim 1 is allowable. Independent claim 7 has been amended to include this allowable limitation – therefore claim 7 is also allowable.

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11. Dependent claims 2-6 and 8-12 are allowable because they depend from allowable independent claims 1 and 7.
12. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a biweek, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753.

Any response to this office action should be faxed to (571) 273-8300, or mailed to:

USPTO
P.O. Box 1450
Alexandria, VA 22313-1450

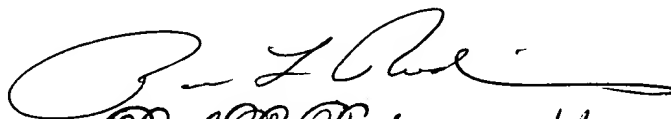
or hand carried to:

USPTO
Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon
Art Unit 2123
April 5, 2006


Paul L. Rodriguez 4/7/06
Primary Examiner
Art Unit 2125-2123